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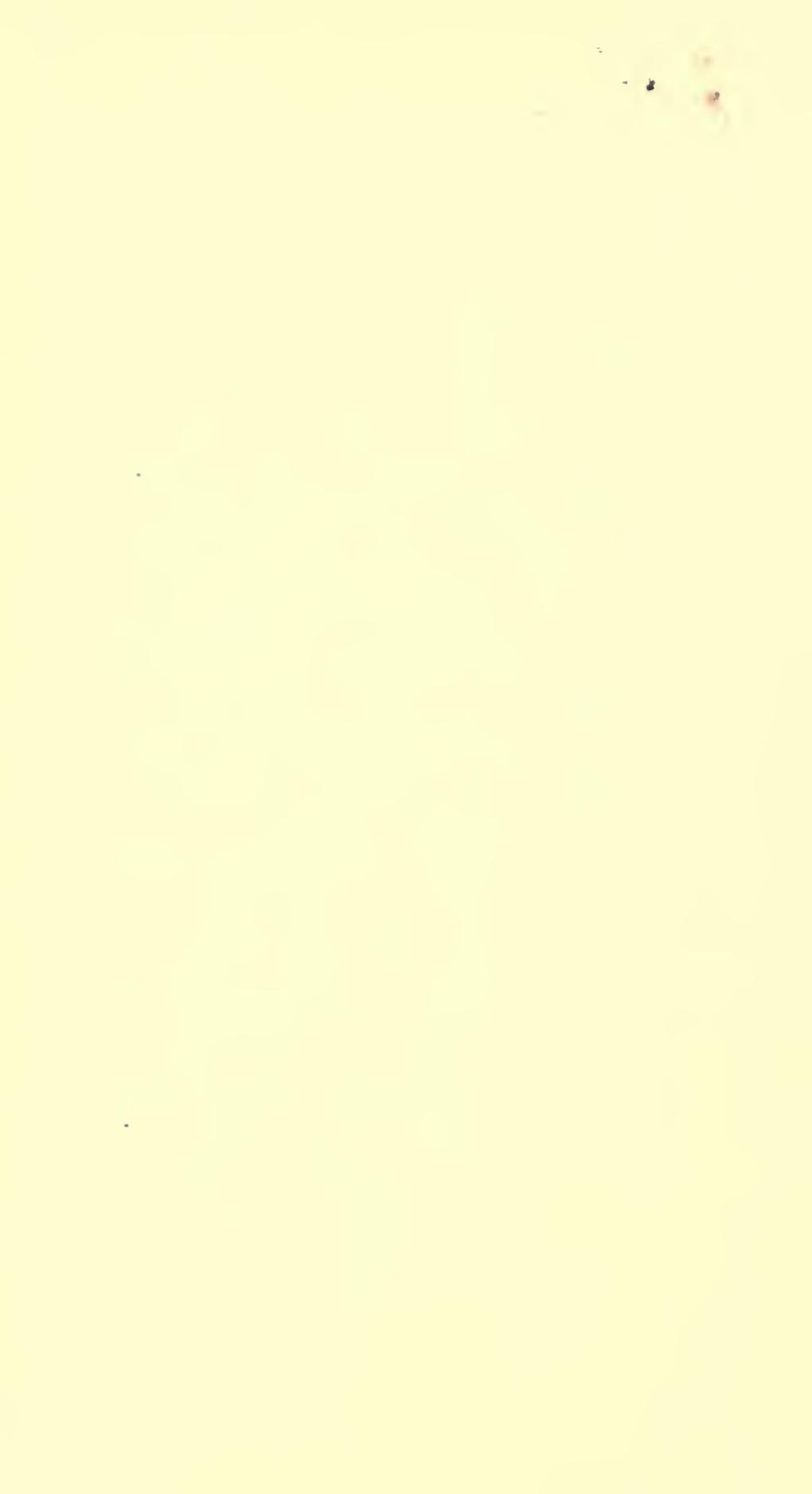








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# REMEDIAL GYMNASTICS FOR HEART AFFECTIONS USED AT BAD-NAUHEIM

BEING A TRANSLATION OF  
"DIE GYMNASIEN DER HERZLEIDENDEN"  
VON  
DR. MED. JULIUS HOFMANN UND  
DR. MED. LUDWIG PÖHLMAN  
BERLIN UND BAD-NAUHEIM

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WITH FIFTY-ONE FULL-PAGE ILLUSTRATIONS AND DIAGRAMS

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## TRANSLATOR'S PREFACE AND INTRODUCTION

THE physical methods of treatment of affections of the heart have made such marked advances in Germany during the last twenty years that they can no longer be regarded as the elaboration of a few enthusiasts. The relative rapidity with which these methods have come to be recognised as therapeutical measures of the first importance has no doubt been greatly due to the existence there of natural thermal springs, highly charged with carbonic acid gas and salines specially suitable for bath purposes in cardiac affections. The success which has attended the use of these waters as baths in conjunction with certain remedial gymnastics, selected on well-thought-out physiological grounds, has been so great as to constitute a new chapter in the practice of Medicine relative to the treatment of heart affections. The greatest enthusiast of these methods would not pretend to credit them with the powers of restoring to health and strength persons whose hearts and blood vessels are hopelessly damaged and beyond repair. But fortunately these are not the majority of the cases met with in practice. Affections of the heart, as a rule, are attended with sufficient discomfort to the patient to cause him at an early period to seek medical advice while the affection is still amenable to treatment, or at least while the condition of the patient can be materially improved. As experience has been gained in their use, the physical methods of treatment have been improved and placed upon a firmer physiological basis; their capabilities also have been more exactly ascertained and their limits of usefulness more accurately defined. In this

advancement of knowledge successive physicians at Bad-Nauheim have played so important a part that the treatment has become peculiarly associated with that health resort and with the name of the late August Schott who did so much, especially in early days, to evolve its principles and establish its practice.

In England the adoption of these new methods has been very slow. It is true that in most recent text-books dealing with heart affections reference is made to the Nauheim treatment, and the exercises elaborated by Schott are frequently described. The latter are also taught to pupils of massage. But notwithstanding the commendations of several of our leading Physicians, both in their practice and in their published works, it cannot be gainsaid that great scepticism prevails in the medical profession of this country as to the value of the methods, and comparatively few practitioners of medicine are personally acquainted with them. In Great Britain and Ireland we have no natural springs highly charged with carbonic acid gas comparable to those of Bad-Nauheim. To carry out the treatment, therefore, as regards baths, artificial means of charging the water with the salts and gas have to be resorted to, or patients have to go to Bad-Nauheim to obtain them. Although for several years past the number of patients who have resorted thither has averaged about one thousand annually, this is but a very fractional proportion of the cases that would be benefited by the treatment. Differences of language, habits, and customs, as well as distance, must ever be formidable barriers in the way of patients going to Bad-Nauheim for treatment. The attempts which have been made to prepare the baths artificially at home have for various reasons not been very successful, although with proper apparatus for charging the water and by the addition of chemicals in the proper proportion there is absolutely nothing to prevent the treatment being carried

out in its entirety with equal success in England as at Bad-Nauheim, once the methods have been learned. It is being done successfully all over Germany. The fact must also be learned that properly charged carbonic acid baths cannot be obtained by passing the gas through the water in the bath, or by adding chemicals to generate the gas in the water of the bath. To get the proper effects of carbonic acid baths, it is essential that the water used for the bath be charged with the gas *under pressure*, so that the latter takes the place of the atmospheric air naturally held in the water. The machinery required for this is expensive, and a properly equipped bath-house is necessary. Hospitals in this country have not yet been provided with such appliances, and, therefore, but few practitioners of medicine have had an opportunity of seeing the physical methods carried out. Yet those of us who have had the opportunity of studying them thoroughly, know and realise the powerful effect for good or evil they possess, accordingly as they are used rightly or wrongly. The action on the heart of the Nauheim baths and exercises is sometimes so powerful that in some cases we may be able to obtain, by means of the one or the other, in a few minutes, the effect we have been trying in vain for weeks to bring about by means of drugs. With remedies which may in some cases act so promptly and potently, caution is very necessary even when the physician is skilled in their use. And just as we do not entrust potent drugs, such as hydrocyanic acid, digitalin, strychnine, etc., to the hands of even trained nurses, except under strict medical direction and supervision, so the physician himself should always personally direct the administration of these physical remedies when beginning them on a patient, and carefully judge the effect they are producing. After he is satisfied as to their action on the patient, he may by degrees avail himself of the assistance of a trained attendant, working under his supervision, in

carrying them out. The medical profession and the public cannot be too strongly warned against the dangerous consequences liable to occur from attempts being made to carry out these physical methods of treatment in Nursing Homes by persons who are not qualified medical practitioners, whose only knowledge of them often is that they may have learned the movements of the different exercises while going through a course of instruction in massage, and who, on the strength of this, advertise their Homes as places where Nauheim treatment can be obtained. The qualified medical practitioner will find that he has much to learn regarding the administration of the remedial gymnastics when he first begins their use. He should never begin by practising them on a person whose heart is affected. At first he is very prone to perform the movements too rapidly, and to offer too much resistance when he attempts resisted movements on the patient. It is only after considerable practice that one comes to know instinctively the details, and is able to observe from the appearance of the patient whether or not too much is being done. Even when there are no indications of strain it is not prudent to rely on visible symptoms, and the means subsequently described in the text should always be taken to test and control the effect of the gymnastics on the patient.

This edition of Dr. Hofmann's work is presented in the English language with the hope that it may be of assistance to members of the medical profession who are desirous of making themselves acquainted with that part of the Nauheim methods of treatment of heart affections which can be carried out in ordinary medical practice, and which, in suitable cases, gives excellent results, independently of the Baths. When the latter are also available, under medical supervision, the range of usefulness of the treatment is vastly extended, and in many cases the combined treatment, sometimes in conjunction with special massage, gives the

best results. Before undertaking the task of translating this work I had, by personal visits to Bad-Nauheim, opportunities of making myself thoroughly acquainted with the various methods and appliances for treatment employed there, and of discussing and testing the objects and relative values of the several remedial gymnastics selected for use by Dr. Hofmann in his splendidly appointed Sanatorium. Although in the main these gymnastic exercises are the same as the series propounded by the late August Schott, several modifications and improvements have been effected since his death in the mode of carrying them out, new exercises have been added, and some of the original ones have fallen into disuse. Subsequent experience in the series recommended in this work has confirmed the favourable opinion I formed of them, and I have used them alone, and, more recently, since I got the Nauheim Bath Institute established at Eversley, in conjunction with the baths, with much success.

In the translation of Dr. Hofmann's text I have adhered as closely to the original as the idioms of the languages would permit, but in the descriptions of the gymnastic exercises I have taken greater latitude, and in some cases have remodelled the directions entirely, when I have considered that by so doing these could be made clearer and more simply expressed. In two instances I have given alternative directions, which from practical experience I have found desirable.

J. G. GARSON.

THE SANATORIA AND BAD-NAUHEIM,  
EVERSLEY, HANTS,  
*October, 1909.*



## AUTHOR'S PREFACE

IN the course of the development of modern therapy it has been proved that, in the treatment of many diseases of the heart and blood vessels, the same successful result is not always obtained by the same means in different cases. In pharmaceutical therapy this fact has long since been recognised. It is therefore not to be wondered at that the same thing should also hold good in physical therapy. Thus, there are many persons suffering from heart affections with whom carbonic acid baths, in any form, do not agree. These patients, on the other hand, very often show an excellent reaction to oxygen baths, or electrical manipulations, especially to the alternating current baths. Splendid results can also be obtained from certain gymnastic cures.

But in heart affections a therapy may be wrongly used. "Overdoing," for example, is a veritable two-edged sword, and just as a patient with heart affection can be benefited by gymnastics properly used, so he can be made worse by overdoing it or by a wrong use of exercises.

We have now collated the most essential exercises for a gymnastic course without apparatus, so that our experience may be at the disposal of Physicians and the public. The book has been written from practice for practice.

DR. MED. JULIUS HOFMANN.



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# REMEDIAL GYMNASTICS FOR HEART AFFECTIONS

## CHAPTER I

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Introduction—The Chief Systems of Remedial Gymnastics used in Heart Affections.

REMEDIAL gymnastics are, as a rule, suitable only in certain cases of heart affection, and the physician has always to consider very carefully whether or not the patient is able to endure the exertion they entail. Other patients, again, are best suited by remedial gymnastics of a very special kind. "Nec nemis" are the words of warning which should ever be present in the mind of the physician when prescribing gymnastic exercises. The reason for this is that, while much good can be effected by the proper use of them, they may cause just as much harm to the patient when wrongly employed. As an illustration of this we need only mention the injurious effects which have often resulted from the Müller exercises on previously healthy hearts.

Before proceeding to indicate which remedial gymnastics are in our opinion the most suitable for heart affections we must consider the following questions :—

1. Which are usually considered the best remedial gymnastics for heart affections?
2. Are several systems equally good? If so, which is the least expensive and generally the most practicable for the patient to carry out wherever he may be?
3. In what affections of the heart should treatment by remedial gymnastics, as a rule, be avoided, and which exercises should, in certain cases, in the interests of the patient, be omitted?

The answer to the first question is that there are three systems of remedial gymnastics which specially claim our

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attention, namely, that of the distinguished Austrian Herz, the Swedish remedial gymnastics, and that, also of Swedish origin, elaborated more especially by the late August Schott.

A fourth method, the Oertel Terrain cure, must be mentioned, though it is not on a par with any of the other three systems just named. The absence of supervision during exercise, not being able to take rest immediately on the appearance of fatigue, and the long interval, at least twenty-four hours, which has to elapse before the exercise can be repeated, make the Terrain cure generally impracticable. Again, for a Terrain cure, the invalid has to walk a certain distance along a road, and then back to the place from which he started. Should, for example, a walk of one hour have been prescribed for the Terrain cure, and the patient have reached the furthest point to which he has to go, situated at a distance of half an hour from his home, it is a very unpleasant experience for him if he then finds himself suddenly overtaken by fatigue. He has still half an hour to walk before he can get home, and, by that time, may be in a very exhausted condition. In a remote sanatorium at which the author was formerly an assistant he has several times seen this actually occur, when, in consequence of the condition of the patient appearing to be better than it really was, too long a walk had been prescribed, or, as more frequently happened, when patients of their own accord took longer walks than they should have done. He has repeatedly seen patients who were undergoing a Terrain cure brought home on a hay wagon in an extremely exhausted condition. That in itself would not have been so serious did not the overstrain always delay the success of the cure. The Terrain cure can only be taken in safety in grounds surrounding a residence on roads specially constructed for the purpose, and arranged so that the walk can be stopped at any time and rest taken forthwith on the appearance of fatigue.

We need therefore only consider the three systems previously mentioned, and of these the last-named is, with certain modifications and some omissions, in our opinion, the most serviceable. In making this selection we are far from depreciating in any way the value of the Herz and Zander systems of remedial gymnastics, but the system which we more particularly favour requires no apparatus, and, if the patient wants assistance, it can be rendered to him by a member of his family, a servant, or a friend. For the other two systems very costly apparatus is in part necessary. In a sanatorium all the three systems are equally valuable, but for home use that to which we have given the preference, because of its requiring no apparatus, being equally good, simple, and the cheapest, is, in our opinion, most to be recommended.

If a patient is physically fit to undergo gymnastic treatment, he should in his own interest place himself for some time under the care of a physician, or in a well-conducted medical institute, to learn how he should do the gymnastics and which exercises are most suitable for him. He should explicitly follow the instructions of the physician under whose supervision he is, and learn by heart the directions given him. "Do such and such an exercise in this way and for so long." "In this exercise take a deep breath at this point," etc. During the first few weeks the effect of each gymnastic exercise should, if possible, be controlled by the physician, so that he may add further exercises, or stop such as are not suitable for the patient. Should at any time the patient find that an exercise causes him any abnormal sensation, he should not console himself with the idea, "Oh, it will soon pass off," but should at once discontinue the exercise and consult his physician. This is especially necessary at the beginning or if the patient is not under the immediate supervision of the physician.

## CHAPTER II

Indications for and against the use of Remedial Gymnastics  
and Baths in Heart Affections.

WE have now to consider the fundamental principles involved in the answer to the question, Who should avoid gymnastics and who should use them? This question has been answered by Romberg,<sup>1</sup> of Tübingen, in a short and concise paper in the following manner :—

“Turning now to the indications and contra-indications, it follows from what has just been said that both methods of strengthening the heart [baths and gymnastics] are only suitable in the initial stage of the disease. It is only then that the heart possesses a certain definite store of reserve strength with the help of which it will be able to respond to increased demands cautiously made upon it. If the stage of severe disturbance of the circulation has already begun, if the heart is already during rest no longer in a position to maintain an approximately normal circulation, if there be continuous and severe dyspnoea during rest, if persistent oedema and effusion into the body cavities be present, then baths and gymnastics are no longer suitable for the patient. After the heart has materially improved they may perhaps be considered desirable. Equally unsuitable are patients suffering from pronounced angina pectoris and attacks of cardiac asthma, as experience shows that dangerous attacks may be brought on by any increased demand on the heart. Similarly unsuitable also are cases in which fresh disturbances have occurred after manifest over-exertion or after an infectious disease. These are benefited only in their later stages by the treatment.

<sup>1</sup> “Über die physikalische und diätetische Behandlung der Herzkrankheit,” Prof. von Romberg, Tübingen. *Medizinisches Korrespondenzblatt des württembergischen ärztlichen Landesverein*, Bd. 77, Nr. 26, vom 29 Juni 1907.

"Great attention should be given to the condition of the vascular system. When considerable arterio-sclerosis is present and the blood-vessels are consequently more or less incapable of adapting themselves to the changing demands upon them, we must remember that the blood requirements of the body have to be regulated by the heart much more than under normal conditions. In arterio-sclerosis baths and gymnastics make heavy demands on the heart, especially gymnastics, so that in pronounced arterio-sclerosis it is better to avoid resistance exercises entirely. Gymnastics are absolutely contra-indicated in all cases in which chronic nephritis is present. Such patients are liable to violent fluctuations of their vaso-motor tonus. In them the demands on the heart can never be estimated beforehand with any certainty. If, on the other hand, as often happens, cardiac insufficiency is the primary disease and the kidney affection is secondary to it, such patients may with advantage be treated with baths and gymnastics.

"Further, all patients to whom an acceleration of the blood-stream is dangerous are naturally precluded from baths and gymnastics, also persons who have had even a slight attack of apoplexy, persons with distinct cerebral arterio-sclerosis, and persons who have recently recovered from embolism. If the condition of the brain improves and the state of the heart renders bath treatment desirable, I advise for these patients baths of medium or almost medium temperature which do not contain carbonic acid gas, such as plain and thermal brine baths. Finally, it is scarcely necessary to emphasise the fact that the general condition of the patient should be taken into consideration, and that those who, above everything, require rest, especially neurasthenics, the over-worked, the exhausted, and the very emaciated should not be put through a severe course of baths or gymnastics, at least at the beginning of the cure.

"If weakness of the heart occurs in a person who has led a physically very active life, it is useless to expect benefit from gymnastic exercises, when the much heavier work required of the heart in his daily occupation has not averted

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the occurrence of insufficiency. But if none of the contraindications already enumerated are present, and especially if there is no contributory overstrain, we may well expect good results in cases where the heart of a muscularly weak person fails. Thus heart-weakness in a muscularly weak but corpulent young person with no arterio-sclerosis is very suitable for gymnastic treatment. In these cases we frequently see most excellent results from strengthening the heart by this means.

"Gymnastics may be more freely prescribed in the after-treatment of cases in which the heart-weakness has ceased to be active, than in the treatment of fresh attacks. In the former careful gymnastic treatment is often a very good introduction to more active bodily exercise, of course only in persons without pronounced arterio-sclerosis, also more especially in young people.

"The question may be asked whether there is any real necessity for the physical methods of treatment, whether the same results cannot be obtained more simply, and with at least equal certainty, by means of drugs. I believe the question cannot be answered in a word. The mode of action of each is very different. Drugs enable the heart to utilise more of its available strength. Whether by continued use they increase the sum total of the heart's strength is not known. But baths and gymnastics we know, by the way they influence the heart, increase its strength, just as dumb-bell exercises increase the strength of the muscles of the arm. There are cases in which drugs fail, as, for example, in many forms of cardiac insufficiency occurring in obese persons without any anatomical lesion of the heart, in many obstinate dilatations of the right side of the heart from mitral stenosis, and when there are lingering remains of overstrain of the heart or of heart-weakness after infective diseases, especially after articular rheumatism. In the first of these gymnastic exercises and in the two last baths render excellent service by increasing the strength of the heart which is too weak to meet the demands upon it.

"Augmentation of the working capacity of these hearts

can often only be effected by increasing their total strength. As they work they are putting forth all their strength, but that is not sufficient to meet the demands upon them till it is proportionately increased. Drugs are powerless to extract any more work out of these hearts.

"In consequence of their modes of action being different there is no objection to prescribing baths and gymnastics in conjunction with drugs. Under certain circumstances the latter put the heart in a condition to derive benefit from the former.

"A further question, specially raised by August Hoffmann, is whether the results of the physical methods of treatment are lasting. Objective statistics on the point are certainly very desirable but beset with many difficulties. It is always somewhat uncertain to judge from subjective impressions. As far as that is possible, I can say from my own experience that very satisfactory results can be obtained in this respect when they are used in the restricted manner just indicated.

"I need hardly mention that all measures taken to strengthen the heart, such as drugs, baths, and gymnastics, can only be employed with prospect of success if its ordinary work be lightened. This applies especially to physical methods which make increased demands on the strength of the heart and work directly in that way. These demands may so easily augment the ordinary work of the heart that the result may not be the hoped-for improvement, but in certain circumstances direct injury to its strength by overstrain. When drugs are given it is the general rule, and very rightly so, to curtail the patient's work or to order complete rest. By so doing the drugs make no increased demands on the work of the heart, they only make more of its strength active and its work improves with this increase of strength. But it happens daily that patients with heart disease are ordered carbonic-acid baths, gymnastics, or even the Terrain cure without reducing their ordinary duties. That is very undesirable.

"To carry out these methods properly the patient requires more rest than he had formerly. The actual amount of rest

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that should be taken depends on the condition of the patient. Precise rules regarding it cannot be laid down, but it is always better to order too much than to run the risk of overstraining the heart. The necessity of resting the heart holds good in ordering all therapeutic measures. For this reason baths and gymnastics should not be prescribed together till it is certain that the heart will react to the additional demand on it in the manner desired. After each bath and each gymnastic practice the patient must take ample rest. It is necessary to be specially stringent in ordering rest after overstrain and to persons suffering from the results of overstrain. More or less extensive reduction of the ordinary occupation must likewise be made in cases of obesity with heart insufficiency. Reduction of bodily weight is better effected by dietetic measures. In obesity, moreover, it not infrequently happens that with greater rest, and in certain circumstances with richer diet than formerly, the patient to his surprise loses weight, sometimes very rapidly, as the stronger action of the heart causes excretion to take place of the surplus water previously retained in the body, which in obesity may reach a very significant amount without causing œdema."

## CHAPTER III

Medical Supervision Necessary—Methods of Controlling the Effects of Gymnastics on the Patient—Observations on the Pulse.

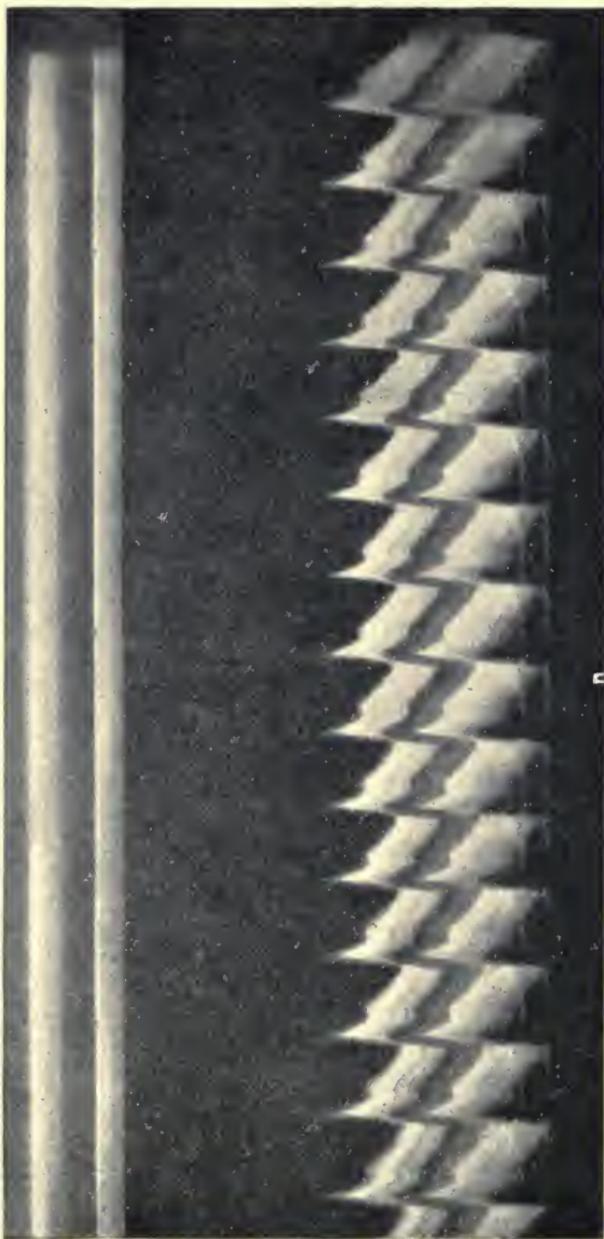
THE principal thing in a gymnastic cure is the instruction of the person who has to do the gymnastics. It should at once be said that at the beginning of a gymnastic cure medical supervision is absolutely necessary in affections of the heart. It is only when a certain stage is reached and the patient can go through certain gymnastic tasks without any effort that he can dispense with medical supervision. Even then it is always necessary for him now and again to see his physician, so that the latter may determine whether the gymnastic exercises which he is taking are suitable for him, and modify them if necessary from actual examination of the patient. In testing the effects of gymnastics from the physician's point of view, the subjective symptoms of the patient play an important part, and the patient who is expecting much from gymnastics may deceive himself by his hopefulness, especially at first. There are some persons who are so hardy that they are hardly ever conscious of slight variations in their state of health. Others again, and these are the more numerous, are of a more nervous disposition, and in their anxiety about their condition often imagine themselves to be worse when they are not. With the former the physician must be cautious and reserved, as they are too ready to say to him, "Give me something more to do, I can bear it." These patients are not always the least affected, and are often dominated by an incredible optimism which might very easily induce the unwary observer to do

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too much, and in this way harm to the patient might arise. The latter, namely, the anxious, he must deal with often in an entirely different manner, and show them, by objective demonstrations, what they can do without injuring themselves, so as to encourage them to attempt exercises which make greater demands on their strength, but are, in his judgment, within their capacity. At the same time the physician must be careful not to make the optimists pessimists, and the anxious indiscreet. In describing objective symptoms it is always best to tell every patient who is curable the absolute truth. The manner in which the information is to be imparted to him is, naturally, a matter of judgment and tact.

For observing the actual effects of gymnastics different methods are now available, by the combined use of which it is possible to get a clear indication of their action. The readiest means of testing whether gymnastics are producing any change in the action of the patient's heart are naturally observations on the pulse. Exertion causes changes in the pulse even in health. Exercises therefore which have been prescribed for a patient should not be at once discarded merely because they increase the rapidity of his pulse ; but after the exercises are over it should fall very quickly to normal. If the increased rapidity of the pulse continues for some time after the exercises, it should undoubtedly be regarded as an unfavourable symptom of the gymnastics. The first criterion therefore is : if after the gymnastic exercises the frequency of the pulse is relatively increased beyond what it was before the exercises, and if after a short rest it does not return to normal, the sign is unfavourable. Of course excessive increase of the pulse-frequency should never occur after the exercises ; thus a pulse of 80 per minute before the exercises should not reach 130 or 140 after them. That would indicate too much had been done. The proper ratio is shown in the three pulse-photograms,

FIG. A



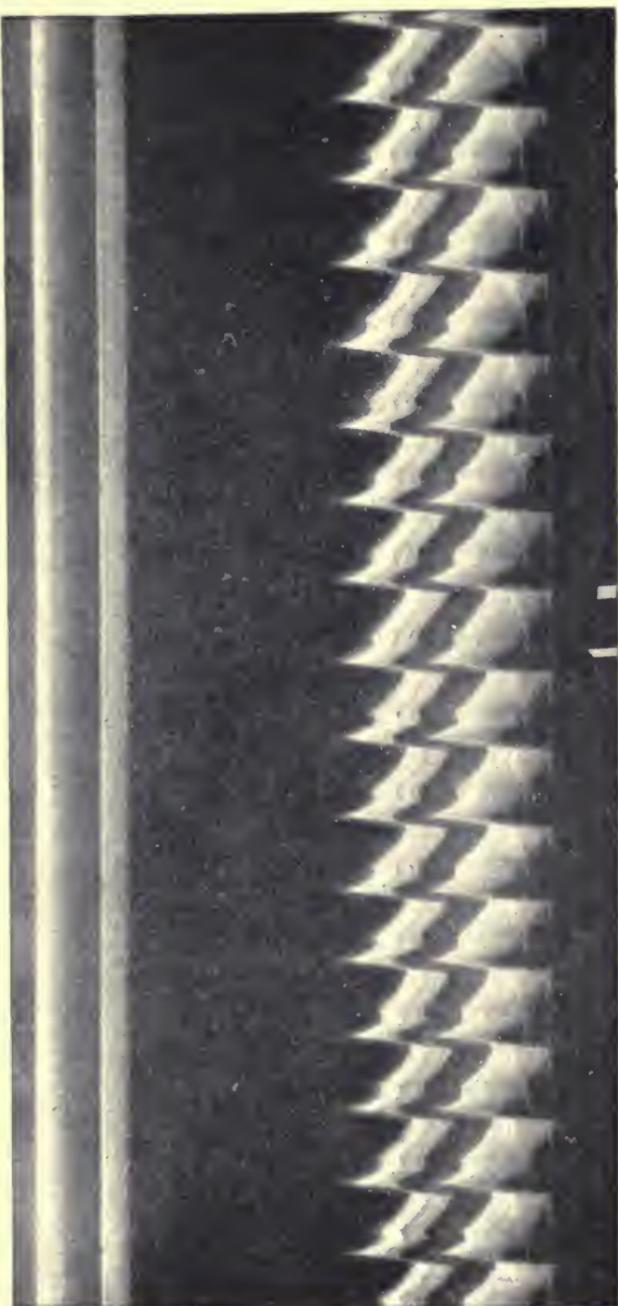


FIG. B

Figs. A, B, and C.<sup>1</sup> These were taken from a patient in whom a severe attack of endocarditis following influenza had left great weakness of the heart. Under careful treatment the patient improved so much that his pulse showed the results indicated in the illustrations. The first pulse-photogram (Fig. A) was taken before the gymnastic exercises, the second (Fig. B) immediately after them, and the third (Fig. C) after the exercises when the patient had rested for ten minutes on a couch. Above the pulse-curve is a white line, with small notches at intervals on its upper surface. The distance from one notch to the other represents an interval of five seconds of time. The first two figures show that the pulse has been scarcely altered by the gymnastics, and Fig. C shows a remarkably steady pulse. The patient always felt fresh and well after going through all our self-resistance gymnastics, and even maintained that these exercises revived him when he felt languid. Two other pulse-tracings, Figs. D and E, show how a pulse of irregular and intermittent character, as seen in Fig. D, has changed till it gave the pulse-curve of regular outline shown in Fig. E. In addition to having valvular disease, this patient also suffered to a slight extent from weakness of the muscular walls of the heart. After food he very often complained of a feeling of weight in the gastric and cardiac regions, and had an intermittent pulse. On several occasions it was found that flatulent distension of the stomach occurred generally between half and three-quarters of an hour after meals. Radiographs taken under these conditions frequently showed the diaphragm to be in an elevated position. At first massage of the stomach was used with success for the flatulency. After the massage the pulse-tracing ceased to be intermittent. At a later period the same result was obtained from gymnastics.<sup>2</sup> The

<sup>1</sup> *Verhandlungen des Congresses für innern Medizin*, 1907, p. 561.

<sup>2</sup> "Pulsaussetzen und Magenblähungen." Dr. Med. J. Hofmann. *Wiener Kleine Wochenschrift*, 1907, Nr. 34.

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pulse-tracings figured were taken before and after gymnastics with resistance. Here then was a case where the alterations in the heart were entirely due to encroachment on its area through the diaphragm being forced upwards by gastric distension. Naturally it would have been bad had a reverse result been recorded in the pulse-tracings. The occurrence after the gymnastics of arrhythmia, which did not previously exist, should make us stop the exercises at once or defer them to a later period ; or, if it had been set up by the greater demands of newly added exercises, to revert to the previous ones requiring less effort.

The pulse should not, however, become too slow after gymnastics. When the pulse is quick it is undoubtedly a good sign if in a short time after the gymnastics it falls below what it was before beginning them. As, for example, when a pulse of 120 per minute rises during the gymnastics to 130, and during the period of rest after them falls to 90 quiet beats. That this is a favourable sign will also be indicated by the subjective feelings of the patient. On the other hand, it should be regarded as a direct sign that gymnastics are producing an evil effect on the action of the heart when, for example, a pulse of 80 per minute slows down 20 or 30 beats during the rest after the gymnastics. If in bradycardia, with a pulse varying from 50 to 60 per minute, gymnastics have the effect of still further lowering the rate of the pulse, they must be stopped at once. A pulse which is usually too slow should become quicker after gymnastic exercises or after a series of such exercises, but never slower, while they should lower the rate of a quick pulse. If gymnastics do not produce the results just mentioned in each of these conditions, then they are not suitable for the patient.

We must now briefly consider the influence of gymnastics on the irregular pulse. We have often observed that an irregular pulse does not become regular, although the patient may assure us that the gymnastics are having a very

FIG. C

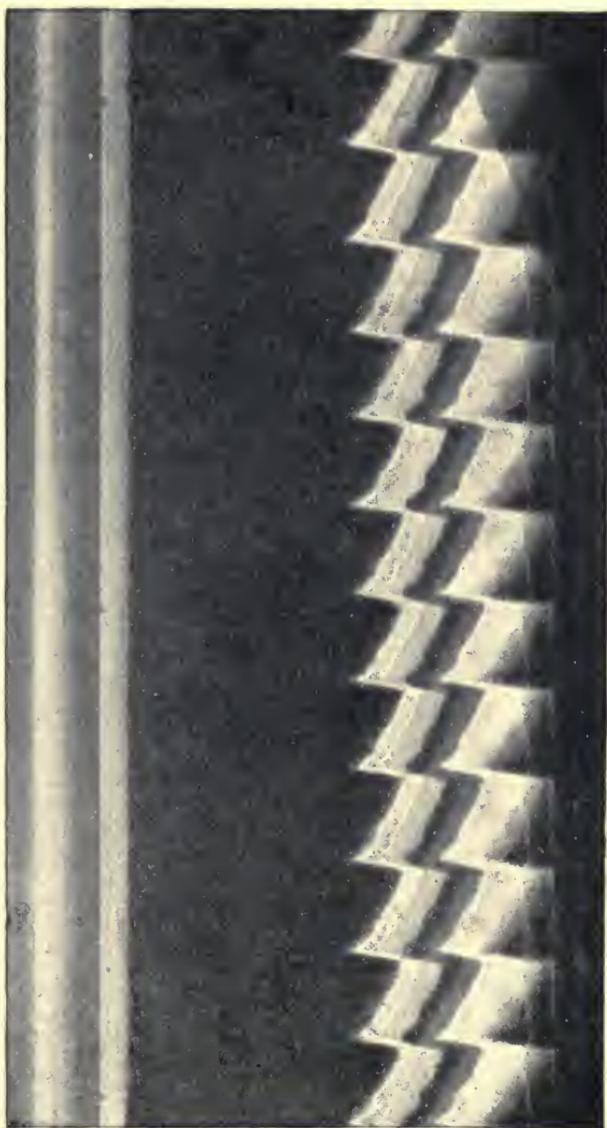




FIG. D



FIG. E



FIG. E

favourable influence on his subjective sensations and condition. Here we are confronted with the want of a proper test to show us by the feel of the pulse the effects of gymnastics. Certainly with the finger we can, by practice, determine whether a pulse has become stronger and whether from being hard it has become soft, which would be good signs ; and with the finger we can also detect bad signs, such as a change from a full and strong pulse to a weak and thread-like one. But, in the case of a very irregular pulse, palpation fails to help us to arrive at a discriminative judgment. We have therefore to employ another method, which is so important that we cannot dispense with it even in patients whose pulses are not irregular, namely observation of the blood-pressure.

## CHAPTER IV

Testing the Effects of Gymnastics by Observations on Blood-pressure,  
Auscultation, Percussion, Röntgen Rays.

In making researches on blood-pressure after gymnastic exercises, we must always take care that the controls are made under similar external conditions ; this applies also to observations on the pulse. We proceed thus :—After a short rest in the horizontal position the blood-pressure is determined by Riva-Rocci's method before the exercises. Certain definite work is then done, and immediately afterwards the blood-pressure is tested in a resting position as before. The patient then does some more exercises, and at short intervals the blood-pressure is tested till the same pressure is shown as obtained before the gymnastics were begun. Great care must be taken that the Riva-Rocci manchette, or preferably the broad modification of it by Recklinghausen, is always applied in the same way, so as to eliminate as far as possible errors of variation. It must always be of the same breadth and be put on the same part of the upper arm ; it is also desirable to have a centimetre scale marked upon it so as to facilitate its being drawn in to the same point each time. After a definite amount of work has been done the blood-pressure will show one or other of the following possible conditions :—

1. The blood-pressure may remain unaltered.
2. The blood-pressure may first rise and then fall to the normal.<sup>1</sup>
3. The blood-pressure may first fall and then rise to the normal.

<sup>1</sup> The normal is regarded here as the blood-pressure before any work has been done.

4. The increased blood-pressure may fall below the normal before it returns to normal.
5. The lowered blood-pressure may rise above the normal before it returns to normal.
6. The increased blood-pressure may sink below and never reach the normal.
7. The lowered blood-pressure may remain under the normal.
8. The lowered blood-pressure may rise above the normal and remain so.
9. The increased blood-pressure may remain above the normal.

The time during which these variations of the blood-pressure should be observed is, in our opinion, ten minutes.

If the blood-pressure does not alter (1), then we may rightly conclude that the exercises are doing the patient no harm, and that they may be continued and increased.

(2) If the blood-pressure is raised it is not a bad sign if the rise be not too sudden. Even in healthy hearts we find the blood-pressure increased with exercise, but afterwards it falls very rapidly to normal. This is an important point in all cases of increased blood-pressure. A moderate rise and a quick return to the normal are favourable signs.

(3) A lower blood-pressure after gymnastic work than before it is not necessarily a bad sign, provided the blood-pressure again rises quickly to the normal during rest. A fall in the blood-pressure after severe exercise may also be observed in healthy persons, and is brought about by the action of the nervus depressor causing dilatation of the cutaneous blood vessels, and so regulating the flow of blood from the aorta where the pressure is highest. But soon after exercise the blood-pressure rises again to the normal, because during rest the increased activity of the heart diminishes very rapidly, the high blood-pressure in the aorta

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drops, and simultaneously the action of the nervus depressor<sup>1</sup> which has caused the dilatation of the cutaneous vascular system ceases. / Thereupon the latter immediately contracts, the transverse diameter of the blood vessels becomes smaller and the blood-pressure rises and may, without any bad results, even exceed the normal for a short time (5). It is different, however, if during rest after exercise the blood-pressure remains for a long time below the normal. Then we have feeble working as a result of fatigue occurring in a weak heart. When the blood-pressure rises after exercises and remains above normal (8), we recognise in this continued secondary elevation of the blood-pressure Moritz's symptom of "strain and exhaustion" which indicates that too much has been done. We must also regard as a sign of strain and exhaustion the fall to below the normal of a blood-pressure which has risen to above the normal (4), and by the amount of rise, the extent of the fall, and the time taken to return to the normal, we form an estimate of the unfavourable effect and overstrain which has resulted from doing too much. Finally, if the blood-pressure rises too violently and remains for a long time above the normal (9), it indicates overstrain, after which we must always fear the effect of exhaustion.

Examination of the heart by means of auscultation and percussion, and also by X-rays, should not be omitted whether the results of gymnastics as shown by the pulse and blood-pressure are good or bad. Regarding percussion, we often find when the pulse and blood-pressure show unfavourable signs after gymnastics, that the area of heart dulness is broader than it was previously; while, on the other hand, an orthodiagram shows no alteration in the shadow of the heart. It was this broadening which in former times frequently led physicians to diagnose acute dilatation of the heart. Fortunately that is not the case, or it would be very serious, as

<sup>1</sup> According to Köster and Tschermak, the nervus depressor ends in the aorta itself.

August Hoffmann was quite right in the assertion which he made at the Congress für innern Medizin in 1902, that acute dilatation is the most dangerous affection of the muscle of the heart. In this instance it is what may be called deceptive dilatation of the heart, and is produced by the heart working in an excited manner and giving off longer acoustic waves. In any case, this deceptive dilatation—that is to say, the sudden appearance of a divergence between the optical (orthodiagram) and the acoustic (percussion) outlines is a warning that we must be cautious in prescribing work. Their coincidence again is indicated by simultaneous improvement of the pulse and blood-pressure. We may be sure that in the majority of cases the heart which shows this very irritable type of action (*v. Criegern*) will also show marked modifications in the blood-pressure of the character of (9) (strain according to Moritz). As it returns to normal, the acoustic outline also returns to that of the orthodiagram. We find this phenomenon very frequently in neurasthenics suffering from heart affection. A suitable course of gymnastics, especially in conjunction with a course of baths, causes it to disappear. In these cases, when the action of the heart is turbulent, the more the acoustic outline approaches the optical, so much the better will be the condition of the blood-pressure and of the pulse, and so much the more will the patient be sensible of the improvement which has taken place in the state of his health.

But, on the other hand, by more minute observation we may be able, after severe gymnastic exercises, when the state of the blood-pressure and of the pulse is not favourable, to ascertain from radiographs that the heart is smaller than formerly. In that case we may have to do with overloading of the greater circulation. Here an examination of the blood-pressure will assist us in testing whether the decrease of the heart's shadow is to be regarded as favourable or not. The result obtained usually corresponds to varia-

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tions (3) and (5), and in the most unfavourable cases to variation (7).

This unfavourable reduction of the silhouette of the heart, which, according to Kraus, is due to imperfect filling of its cavities, is not a satisfactory sign. It arises through functional weakness of the heart which is not strong enough to carry on properly the flow of blood in the greater circulation. Equally unfavourable is enlargement of the heart, which, especially when the walls of the right ventricle are weak, is produced by its strength not being sufficient to carry on effectively the lesser circulation through the lungs. We also find in the bad results shown by the blood-pressure (falling below and remaining under the normal) confirmatory evidence of an unfavourable nature. In these cases baths (especially alternating current baths), in conjunction with carefully conducted gymnastics, act very beneficially—much better and more energetically than CO<sub>2</sub> baths. In cases where we have only to deal with irritable action, the strong stimulus of the alternating current increases the irritable condition. Oxygen baths and weak CO<sub>2</sub> baths should, on account of their soothing effect, be given in such cases. It must not be forgotten, also, that hydrotherapy acts often in a marvellous manner in consequence of the stimulating effects of temperature. The object of employing these various means of relief is to overcome the resistance of the muscular coats of the vessels. Gräupner has, as far back as 1896, rightly laid stress on this being the principal effect of the Nauheim baths. Absolute increase of the work of the heart, such as can be obtained by the action of digitalis (and as we can also get by means of suitable gymnastics), cannot be obtained by baths.

## CHAPTER V

Testing the Influence of Gymnastics by Sommer's Analysis of Movements—Observations on Respiration.

BESIDES the means of investigating and controlling the influence of gymnastics just discussed, we have been trying another method, which is very sensitive in showing the slightest sign of fatigue. It is still very new, and requires to be tested much more extensively. But from the experience we have had of it we consider it very useful, and should not like now to do without it. It consists in testing fatigue by means of Sommer's Analysis of the expression of motion.<sup>1</sup>

Every trembling movement of the extremity is divisible into three phases: a movement from before backwards and *vice versa*, a movement to the side, and a movement from below upwards and *vice versa*. By means of an ingenious apparatus Sommer has succeeded in splitting up and registering graphically any trembling movements which may occur unconsciously and uninfluenced by the will of the person under observation, into the three above-mentioned component parts. If when a person comfortably seated holds out his leg in an extended position there be no trembling movement present, three straight lines will be registered on a revolving cylinder covered with blackened paper (Figs. F and H); but if there be any trembling motion, the upper line will show the trembling motion from below upwards, and from above downwards, the middle line will show the side movements, and the lowest line those from before backwards

<sup>1</sup> Psychopathologische Untersuchungsmethoden v. A. Robert Sommers, Prof. Dr. Med. u Phil., Urban und Schwarzenberg.

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and the reverse. In Figs. F and H are shown tracings of a leg held perfectly still, and in Fig. I a violent tremor is depicted. In our experiments we always used the leg, and tested the same limb always before and after exercise in the following manner. The patient having seated himself comfortably on a chair was told to extend his leg, which was supported while round the ankle was being placed a manchette connected by means of a rod to the writing works of the instrument in such a way that the slightest movement of the leg was directly transmitted to it, and the jerks corresponding to the three phases registered. After the manchette was fixed, the patient was told to hold out his leg unsupported and keep it quietly but not too rigidly extended, and to shut his eyes. The cylinder was then made to rotate, and on the smoked paper round it were recorded three more or less regular lines showing the absence of tremor or its presence in a stronger or feebler degree in the limb. From the four tracings figured it will be seen that there is no difference between Fig. F, taken before, and Fig. G, taken after resisted gymnastics; whereas there is a marked difference between Figs. H and I, also taken before and after resisted gymnastics. The latter figure shows the tracings of great fatigue.<sup>1</sup>

The theory of this control is based on the fact that the person whose muscle is tired is not able to hold his leg out straight with the same ease as when his muscles are not fatigued. He must exert himself when he is tired to do the same thing that he could do, when fresh, without fatigue or strain. The strain of the muscular system—that is to say, the energetic contractions of the quadriceps—is indicated by more or less strongly marked tremulous movements. It is an excellent illustration of Moritz's "will-strain and fatigue" shown unconsciously by a tired patient.

<sup>1</sup> Fig. I was taken intentionally when the limb was very tremulous for the purpose of demonstrating the tremors clearly.

FIG. F (BEFORE GYMNASTICS)



STATE NORMAL SCHOOL,  
LOS ANGELES, CAL.

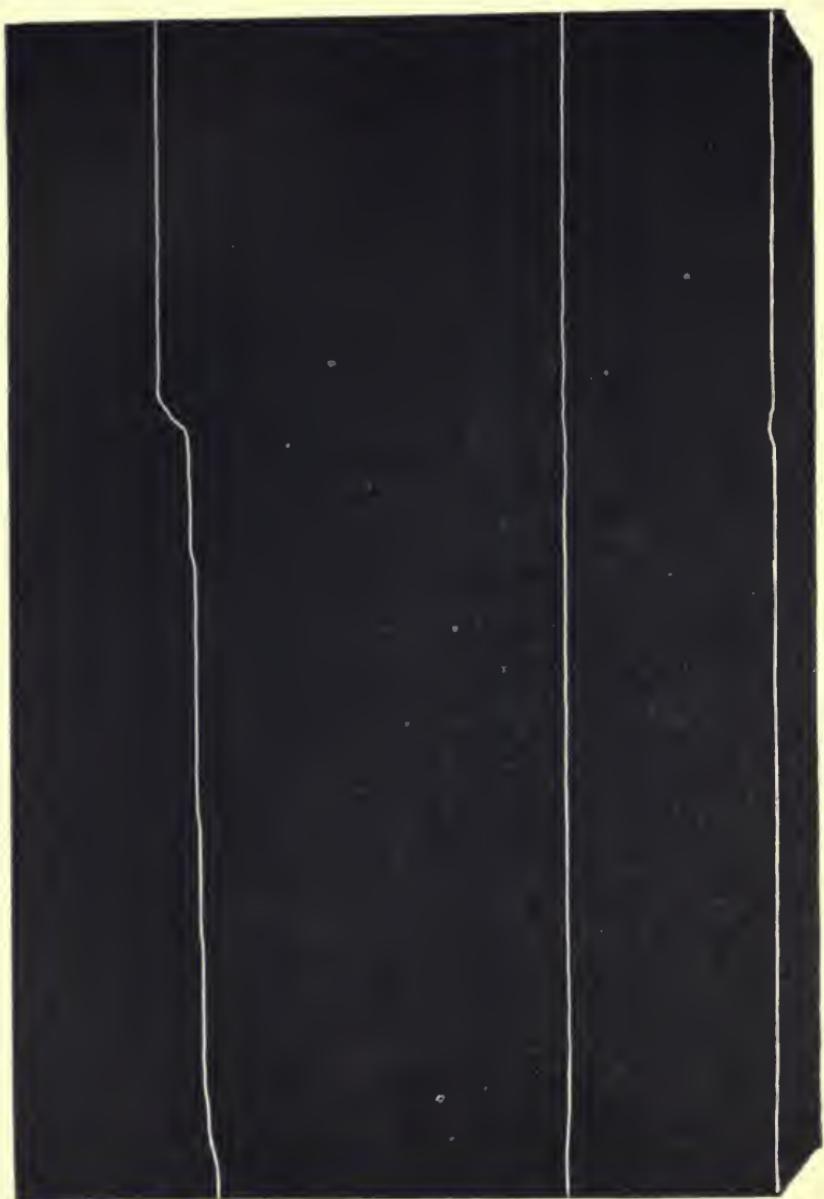


FIG. G (AFTER GYMNASTICS)

In this control the nature of the variations in the three component curves informs us whether or not too much has been done by the patient. The results given by the pulse and blood-pressure may be confirmed or differentiated by this method. Thus, if after gymnastics the result of an examination of the blood-pressure is unsatisfactory while that of the analysis of the expression of motion is good, we may be sure that the blood-pressure and the pulse will soon change for the better.

At the Congress für innern Medizin, 1907, F. Klemperer laid stress on the fact that he has found all the curves, i.e., Gräupner's Pathognostic blood-pressure curves, in healthy persons as well as in invalids. We can also confirm the statement that blood-pressure curves, apparently morbid, are frequently obtained from healthy persons. But stress must be laid again on the fact that one method of investigation only is not sufficient for all requirements. If by different methods of research (as, for example, those already mentioned) we find pathological conditions or deviations from the normal present in each instance, then we are fully justified in speaking of them as morbid conditions, as we have then a criterion to go by. It is only by taking into account the several results derived from different researches by different methods that we can obtain sufficient information. Thus by auscultation of the heart we can discover with certainty valvular defects. But it is from the blood-pressure, the pulse, the orthodiagram, functional examination (for example, by Rumpf's method), examination of the liver, urine, lungs, etc., that we discover whether or not the valvular deficiency is compensated or the heart is easily fatigued. A markedly different finding after a single research by one method of investigation should not induce us to form a premature judgment of the case, but should incite us to try all the other methods, so as to guard ourselves as far as possible against the danger of being deceived. The most

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painstaking observation is especially necessary in the medical control of gymnastics. It is in this way only that the patient can obtain what he expects of us, and we ourselves will find satisfaction in our work.

In conclusion, we have still to mention one very important kind of research, which is also one of the earliest. It is observation of the Respiration. After the exercises it should show no unfavourable symptoms as regard either frequency or depth. An old practitioner used to make his heart-affected patients go up a short flight of stairs, first slowly and then quickly, to test the action of their hearts. Then from the condition of the pulse and the respiration after each test he used to draw his conclusions, which always stood him in good stead. In this way he obtained the combined results of two methods of investigation, even though they were only of the simplest and readiest kind.

FIG. H (BEFORE GYMNASTICS)





FIG. I (AFTER EXCESSIVE GYMNASTICS = FATIGUE)

## CHAPTER VI

The Different Ways in which Gymnastics may be Used—Their Object

**I**N plates 1-42 are shown photographic reproductions of those exercises, which in the opinion of the authors are best suited for the gymnastic treatment of heart affections. The exercises may be practised either as "passive" or as "active" gymnastics. At the outset it should be stated that exercises 1 to 8, which should be done while the patient is lying in a recumbent position, may also be used as resistance gymnastics by instructing the patient to perform the movements against resistance offered by the person who is superintending the gymnastics. As during the early stages of convalescence passive gymnastics are in the first instance principally wanted and have to be undertaken in the lying position, we have preferred to illustrate them being done in that position and in the passive form. When the patient has so far improved that he can practise the gymnastics sitting or standing, passive gymnastics are only suitable for the first few sets of exercises at most.

In passive gymnastics the patient, having assumed the proper position for the exercise, relaxes his muscles entirely as in sleep; the superintendent then proceeds to perform the different exercises upon him while he does not exert his muscles in any way. Thus, for example, the superintendent (designated H throughout the series of exercises) raises the patient's leg, rotates his trunk, etc., while the patient himself (designated G in the exercises) does absolutely nothing. He simply allows his arms, legs, and trunk to be moved without his putting forth any nerve energy into

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his muscles ; in short, he is entirely passive as regards the gymnastics.

As the cure progresses the patient proceeds to active gymnastics with resistance ; that is, he performs the different exercises himself by innervation of his muscles ; he bends his forearm, for example, instead of having it bent for him, while the superintendent resists his action gently at first but with increasing force.

We can readily appreciate how exceedingly varied the graduations may be made in these gymnastics beginning with the smallest possible exertion, such, for example, as is entailed in simply raising and lowering the fully relaxed arm of a person resting quietly in a horizontal position, up to the strong resistance which can be offered when the exercise is performed by the patient.

The exercises require more effort on the part of the patient when done without the assistance of the superintendent, and also the more slowly they are executed. The patient is directed to bend the arm slowly and to straighten it again, to raise the leg slowly and then to lower it, to rotate the trunk slowly, etc. When practised in this way without assistance the exercises should be performed by the patient without straining his muscles. They should also be done as slowly as possible and without strong will-power being brought to bear upon the muscles, so that muscular strain may be avoided as much as possible. Thus performed the gymnastics form an intermediate step between resistance gymnastics and actual self-resisted gymnastics, though in reality this is the lightest form of self-resisted gymnastics, since the patient must of necessity, in order to do the exercises as slowly as possible, permit a certain amount of self-resisting influence to come into action. These self-performed gymnastics without resistance when done slowly and without putting forth strained muscular action have an exceedingly soothing effect, especially in

nervous patients (neurosis of the heart). We have often observed that the severer form of gymnastics without apparatus, in which there is strong innervation of the muscles and strained muscular action, are badly borne by neurasthenics, whereas this milder form never fails to produce its soothing action and to effect improvement and ultimate cure in these cases.

The strain on the patient is still further increased when he is directed to apply to himself the resistance which had previously been offered by the superintendent. To do this the patient has to imagine that someone is impeding him in the performance of his gymnastic exercises. He has, for example, to imagine that when bending his arm someone is resisting the movement by counter-pressure, and, with this thought fixed in his mind, to perform the gymnastic with an effort proportionate to the resistance which in his imagination is being offered. This highest step in our forms of gymnastics is termed self-resisted gymnastics (*selbsthemmungs-gymnastik*), as the patient himself supplies the resisting force in each gymnastic exercise.

When practising this form of gymnastics, for which all the exercises of the series we have arranged and illustrated are suitable, the supervising control of the physician is especially necessary. Overstrain can very easily result from them unless each exercise is carefully graduated to the patient. One of our greatest authorities on gymnastics, Herz of Vienna, who has already been mentioned, has not inaptly employed this kind of gymnastics for testing the functional efficiency of the heart. Even a healthy person is easily tired if he attempts to do several self-resisted gymnastic exercises without previous practice. To determine whether the patient is bringing into play sufficient counter-innervation while doing self-resisted gymnastics is not a difficult matter for the physician. It is more difficult

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for him to determine whether the patient is not over-exerting himself by putting forth too much innervation. Nevertheless he must estimate exactly the amount of effort the patient may be permitted to exert. To enable him to do this he must during the stages before self-resisted gymnastics are begun—namely, when passive and active resistance gymnastics are being practised—form a clear idea in his mind of what his patient is able to do. He must now look out even more sharply than he did in the earlier stages for signs of approaching fatigue. For this purpose the use of Sommer's Method, previously described, has in our hands rendered us excellent service when training patients in this form of gymnastics.

## CHAPTER VII

The Order in which the Gymnastics should be practised and their object—  
Special exercises—The Importance of Breathing properly during the  
exercises—The Clothing during and after exercises—Diet and Stimulants.

WE have now to discuss generally the question of the order in which the exercises should follow one another. In the first instance simple passive gymnastics should be practised lying down, namely, the exercises 1 to 8 inclusive. When these exercises can be undergone without showing any signs of fatigue, the patient can then proceed to passive exercises in the standing position, by adding to the exercises in the lying position some passive exercises standing. When sufficient progress has been made so that the patient is able to do all the exercises from 1 to 27 inclusive, one after the other, passively, without any signs of exhaustion, but of course with a short pause between each, active-resistance gymnastics may be begun in the lying position, in the first instance by introducing into the exercises formerly practised passively some slight resistance (as, for example, by offering slight resistance while the arm is bent by the patient in the lying position). Then gradually all passive movements are replaced by resistance exercises, till the patient can do these exercises one after the other without any exertion to speak of. Again, in the same way as we proceeded from purely passive gymnastics to resistance gymnastics, we pass on to self-resisted gymnastics. When we have reached the stage that the exercises can be done by the patient as self-resisted gymnastics without showing signs of fatigue, the patient may be permitted to do the remainder of his gymnastic course without medical supervision. But even then the patient should, especially at first,

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consult his medical attendant at least once per week for purposes of control, so that the latter may satisfy himself that no overstrain has taken place in the interval.

On an average at least half a minute will be required for each exercise, inclusive of pauses, and after each exercise a short rest should be taken. It must be remembered that these gymnastics are not for the purpose of amusement, nor is the object for which they are used to beat the record in acts of strength. Their sole object is to enable the organism to perform "certain work for a given purpose with the least possible excitement of the heart and vascular system." When we have reached the stage that a patient is able to perform the exercises of self-resistance gymnastics with the strongest counter-innervation without causing more than very slight excitement of the heart and vascular system, we may be sure that he will then be in a position to surmount the physical exertion of his daily life.

In the foregoing brief outline of our exercises we have always referred to those numbered 1 to 27 only. Figs. 41 and 42 show a gymnastic exercise with apparatus by which the patient can practise trunk-bending in the lying position. Raising the trunk from the horizontal to the vertical position is the most exhausting gymnastic exercise which we know, and to reduce the exertion it entails we designed the apparatus figured. By unfastening one or more of the spiral springs which, by their strong traction, assist the patient in raising himself, the exercise can be made more difficult. The object of this exercise is chiefly to strengthen the muscles of the abdomen. It is only intended for those patients who are able to do all the self-resistance exercises without much exertion. On patients whose digestion is out of order this exercise has a very salutary effect; it is, however, quite apart from our specific gymnastics. In heart affections we disapprove of every form of gymnastic exercise which favours the flow of a strong current of blood

to the head, and lay it down as one of the first rules in gymnastics that the head should always be the highest point. We therefore disapprove of deep trunk-bending in the standing position, as in it the head is too deeply depressed and congestion is favoured. Exercise 28 takes the place of trunk-bending. In it the head always remains highest, as can be easily seen in Figs. 41 and 42. Finally, another exercise which we have not figured, as it is so generally known, is knee-bending. This exercise also we can only recommend for those who have gone through self-resistance gymnastics with success; for other patients it is too exhausting. It has a special value, however, as in it we possess an excellent means of testing functional efficiency. A patient who, before beginning gymnastics, shows signs of fatigue after bending the knee once or twice may at the conclusion of a gymnastic cure easily bend it a dozen times without our being able objectively to detect any tiring effect from the exercise.

Breathing plays an exceedingly important part in gymnastics. The lightest form of passive gymnastics forebodes only too frequently a strain on heart patients. Every muscle when working requires oxygen, and a supply of this gas must be provided for in the most rational way during gymnastics. This can be best effected by introducing breathing pauses during the gymnastics, and by letting the patient take deep respirations (abdominal breathing) as often as possible, not only during the course of an exercise, but also between each exercise. On the other hand, we must also take care not to make him take deep breaths while he is in positions which are unsuitable for abdominal breathing. Thus it would be wrong to let a patient stop to take a deep breath during gymnastic 27, Fig. 40. It is especially desirable that at the conclusion of the gymnastics task the patient should take twenty to thirty deep respirations while lying down resting.

The clothing worn while the gymnastics are being practised should be as light as possible, the patient should at least take off his coat and collar. The ideal condition under which all these exercises should be taken is in as large and airy a room as possible. During a gymnastic cure this is not always possible, but when the patient has finished his cure under his physician and is to continue the exercises independently at home, this condition should be impressed upon him. Finally, it may be mentioned that after gymnastic exercises a suitable cool rub down or a warm bath which is cooled down slowly is much to be recommended. For cooling down the baths Hofmann's cooling tubes are very useful, as they reduce the heat of the bath equally to the desired temperature either rapidly or slowly, whereas simply running cold water into a warm bath to cool it always does so unevenly.

After gymnastics the patient should rest clothed as lightly as possible. If he has perspired during the gymnastics he should change his underclothing when finished, and should not mind the trouble this entails; for this purpose also he should always take with him fresh linen when he has to go to the physician for exercises, as it might be dangerous for a heart patient to go after his exercises into the cold air with damp underclothing, especially in winter.

It naturally stands to reason that the best gymnastic as well as the most careful use of the best physical therapy will be useless if the invalid does not carry out definite dietetic measures. It may often be observed that even at large and famous health resorts the most promising cases become worse, because in the first place the patients are unreasonable in eating and drinking, and secondly, because in the hotels and pensions the care necessary in feeding invalids with heart affection is not taken. This is an old indictment which, curiously enough, no one will grapple with. It is not merely by the visit of the physician, by taking the baths

he prescribes and by practising gymnastic exercises under his eye, but also by following a definite mode of living with respect to eating and drinking that the cure will be successfully effected. We are not fanatical supporters of abstinence theories, and have repeatedly learned from experience that a glass of good wine does not harm the patient but renews his vital energy. In spite of the risk of being thought behind the times, we nevertheless entirely agree with the old and distinguished authorities of the last century in this respect. We do not wish to say a single word in favour of indulgence in alcohol, but recommend moderation and lay stress on the fact that there are certainly many cases where use of alcohol must be entirely forbidden. It would be foolish to suddenly prescribe wine for a patient who for years past has not taken a drop of alcoholic liquor; on the other hand, it appears to us to be very unnecessary, especially in the case of elderly gentlemen who have been accustomed to their glass of wine for years, to suddenly insist upon their becoming total abstainers. We have never seen any success from such a course, but we recollect well an elderly gentleman, who of his own free will promised to abstain from alcohol, and made so brilliant a gymnastic cure that he described himself and still does as a "record patient"; nevertheless, after six weeks of his cure; he confessed to us that he had drunk a glass of red wine every day at midday and half a litre of beer each evening, as he had been accustomed to do from his youth upwards. It did no harm to him then, nor does it do so now.

Other exercises could have been added to the list described and figured, but those selected are, for the most part, recognised as being the best adapted for heart patients. The field of exercises should be better defined by the eliminations which have been made.

In conclusion we must once more repeat the warnings: "The patient with heart disease must learn the gymnastics

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from the physician. All movements and exercises in remedial gymnastics must be made slowly. All rapid movements (for instance, arm-circling) should always be avoided."

DIRECTIONS FOR THE PERFORMANCE  
OF  
THE GYMNASTIC EXERCISES  
  
AND ILLUSTRATIONS.

*Explanation of the Text.—***G** is used in the Directions to designate the patient who is practising the Gymnastics. **H** denotes the person who superintends the Exercises and aids in their performance.







### No. 1. Figs. 1 and 2.

G. lies comfortably on his back on a couch, with his limbs extended and his muscles fully relaxed. H. places himself at one side of the couch and takes hold of G.'s wrist with his hand corresponding to it, while he places his other hand on G.'s shoulder of the same side to fix it. H. now bends G.'s forearm slowly upwards and backwards on the upper arm. The extent to which the forearm should be bent is personal, and depends upon the amount of exertion G. may be permitted to have. That amount being reached, G. retains his arm for a few seconds in the flexed position and breathes deeply. H. then brings G.'s arm slowly back into its position of rest at starting.

Exercise of the other arm then follows in the same manner.



**No. 2. Fig. 3.**

G. lies comfortably on his back on a couch with his limbs extended and his muscles fully relaxed. H. places himself at one side of the couch near the foot, and taking G.'s hand nearest to him in his, moves slowly away from the couch and draws G.'s arm outwards from the body. The extent to which the arm should be moved is personal, and depends upon the amount of exertion G. may be permitted to have. That limit being reached, G.'s arm remains for a few seconds in the abducted position while he breathes deeply. H. then brings the arm slowly back to its original position.

Exercise of the other arm then follows in the same manner.



**No. 3. Fig. 4.**

G. lies comfortably on a couch with his limbs extended, his feet close together, and his muscles fully relaxed. H. places himself at the foot of the couch, and taking a light hold of the points of G.'s toes, rotates his feet slowly outwards. G.'s feet remain for a few seconds in the position shown in Fig. 4, and H. then presses them slowly together again.



**No. 4. Fig. 5.**

G. lies extended on a couch with his feet close together and his muscles fully relaxed. H. places himself at the foot of the couch, and taking hold of G.'s legs firmly above the ankles, raises the limbs slightly and draws them slowly apart. In this position (Fig. 5) they remain for a few seconds, during which G. breathes deeply. H. then brings the limbs slowly together again and finally lowers them on to the couch.



**No. 5. Fig. 6.**

G. lies extended on a couch with his feet close together and his muscles fully relaxed. H. places himself on the right side and near the foot of the couch, and, taking hold of G.'s right foot by the heel with his right hand, slowly raises the leg and draws it outwards (i.e. abducts it), moving himself in the act a little away from the couch. The position being reached which is shown in Fig. 6, H. takes hold of the point of the toe with his left hand, and rotates it slightly outwards, then inwards, and finally back to the vertical position. A pause follows, during which G. takes a deep breath. After that H. brings the limb slowly back to its original position on the couch by reversing the previous movements.

The other limb is then exercised, H. standing on the left side of the couch and taking hold of the ankle with his left hand and rotating the foot with his right hand.







### No. 6. Figs. 7 and 8.

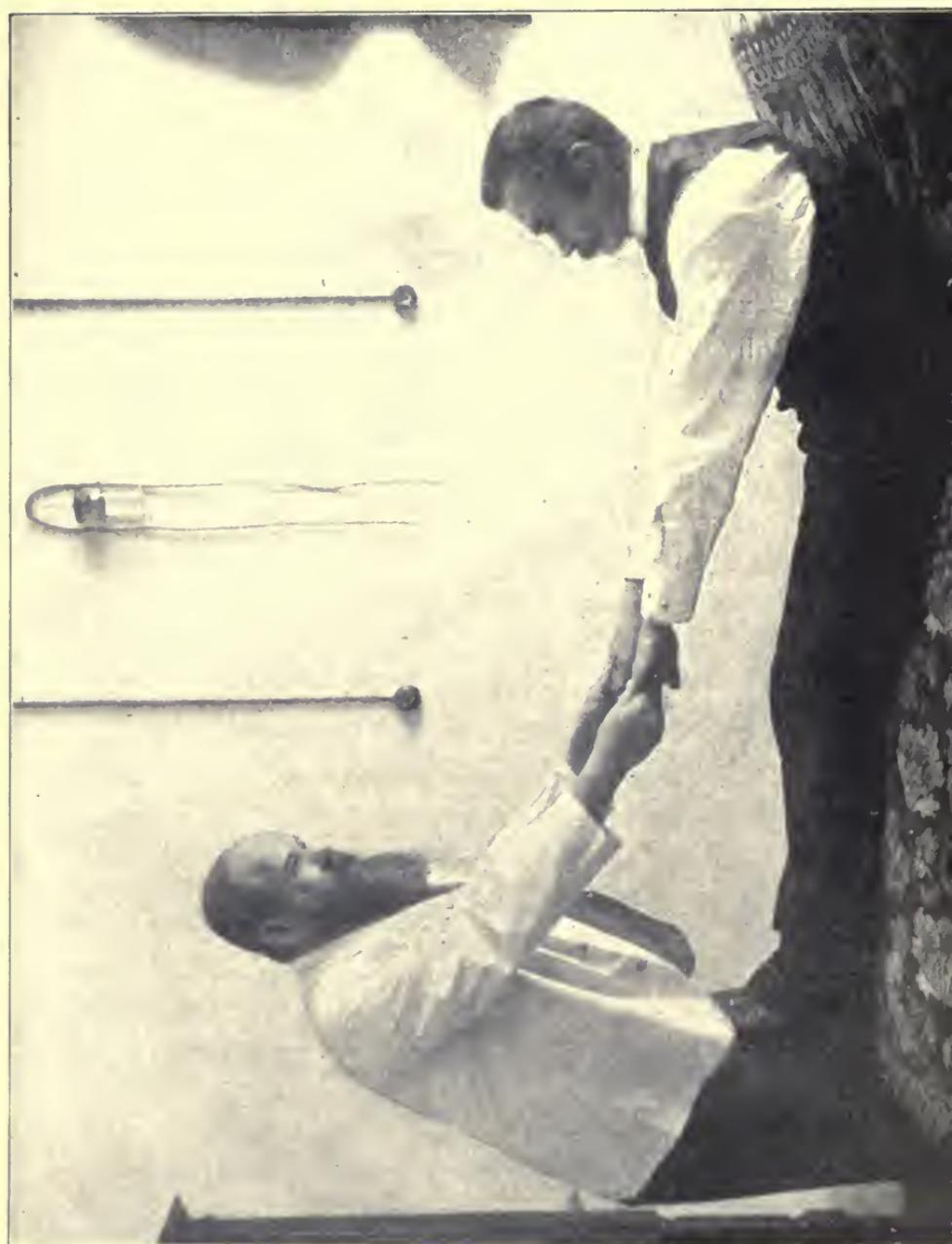
G. lies extended on a couch with his feet together and his muscles fully relaxed. H. places himself at the right side of the couch, which he faces, opposite the patient's knees, and takes hold of the leg nearest to him just above the ankle with his right hand, while he places his other hand immediately above the knee-joint. H. then bends the limb slowly at the hip and knee joints by pushing the leg upwards till the thigh is at a right angle to the body and the leg and thigh form an acute angle with one another. In this position, shown in Fig. 7, the limb is allowed to remain for two or three seconds, during which G. takes a deep breath. After that H. raises the leg slowly, and, by simultaneously pressing gently with the hand on the knee, brings it into line with the thigh, as shown in Fig. 8; finally he lowers the extended limb into its original position.

The left limb is then exercised in the same way.



**No. 7. Fig. 9.**

G. lies extended on a couch with his feet together and his muscles fully relaxed. H. stands at his feet, which he takes hold of by the heels, and raises both limbs slowly, bending them at the hip-joints while at the knees they are in an extended position, till they form an obtuse angle with the trunk, as is shown in Fig. 9. In this position they remain for a short time while G. takes a deep breath, which he should be able to do freely; if any difficulty be experienced, the exercise is either unsuitable for him, or the limbs have been bent too much upward at the hip-joint. In the latter case the exercise may be repeated, but not on the same day; and care should be taken that the limbs are not raised as high as on the previous occasion, so that the angle formed by them with the body is more obtuse. After G. has taken a deep breath, H. lowers the extended limbs to their original position.



**No. 8. Fig. 10.**

G. lies on a couch with his feet together and his muscles fully relaxed. H. stands at his feet, and bending forward with outstretched hands, clasps G.'s hands, which the latter extends to him without moving from the horizontal position. H. now draws G. slowly towards him till G. is in a half-sitting attitude, and then, without any pause, lets him gradually sink backwards again into his original position of rest.



FIG. II

**No. 9. Fig. 11.**

G. stands with his feet together in the military position of attention, his arms hanging vertically from his shoulders. H. stands at his right side, and places his right hand on G.'s wrist and his left on G.'s shoulder. G. now bends his forearm upwards towards his shoulder without moving his upper arm, which remains firmly pressed against his body, the forearm only being moved in this exercise. H. resists the movement by counter-pressure downwards with his right hand, while with his left he prevents the shoulder being raised during the exercise. When the forearm has been flexed to the desired extent, G. forthwith brings it slowly back to the vertical position without making any pause between the movements. H. resists the return movement by counter-pressure, as shown in Fig. 11.

Exercise of the left arm is then proceeded with in the same manner.



FIG. 12

**No. 10. Fig. 12.**

G. stands with his heels together in the military position of attention, and stretches one of his arms horizontally outwards and forwards, the forearm being midway between pronation and supination. He now flexes the forearm, bringing the hand towards his face (Fig. 12). H. stands in front and to one side of him and resists the movement with his one hand, while the other is placed on G.'s shoulder so as to keep it fixed during the exercise. G. then, without making any pause, slowly brings his arm again into the extended position, while H. resists the movement.

The other arm is then exercised in the same manner.



FIG. 13





FIG. 14

**No. 11. Figs. 13 and 14.**

G. stands with heels together in the military position of attention. He extends his arms forwards (Fig. 13). H. takes hold of them from below. G. now moves them outwards (Fig. 14), whilst H. resists the movement by exerting counter-pressure. In doing so H. must advance towards G. by short steps. The extent to which G. may expand his arms is personal, and depends upon the amount of exertion which it is desirable for him to have. That being reached, G. takes a few deep breaths. H. then taking hold of G.'s extended arms above the wrists from their inner (or front) surfaces offers resistance, while G. brings them back to the position at starting. During the return movement H. must take a few steps backwards.



FIG. 15





FIG. 16

**No. 12. Figs. 15 and 16.**

G. stands with his heels together in the military position of attention. He stretches out his arms in front of him, Fig. 15. H. takes a light hold of his wrists. G. then raises his extended arms, Fig. 16, to which H. offers resistance by light pressure downwards. While resisting the movement H. must advance a few steps towards G. The height to which G. may raise his arms is personal, and depends upon the amount of exertion which it is desirable for him to have. That being reached, G., without any pause and without breathing deeply, brings his arms back slowly to the position they were in at starting, whilst H. resists the movement by counter-pressure upwards, Fig. 16. In doing this H. must take a few steps backwards.

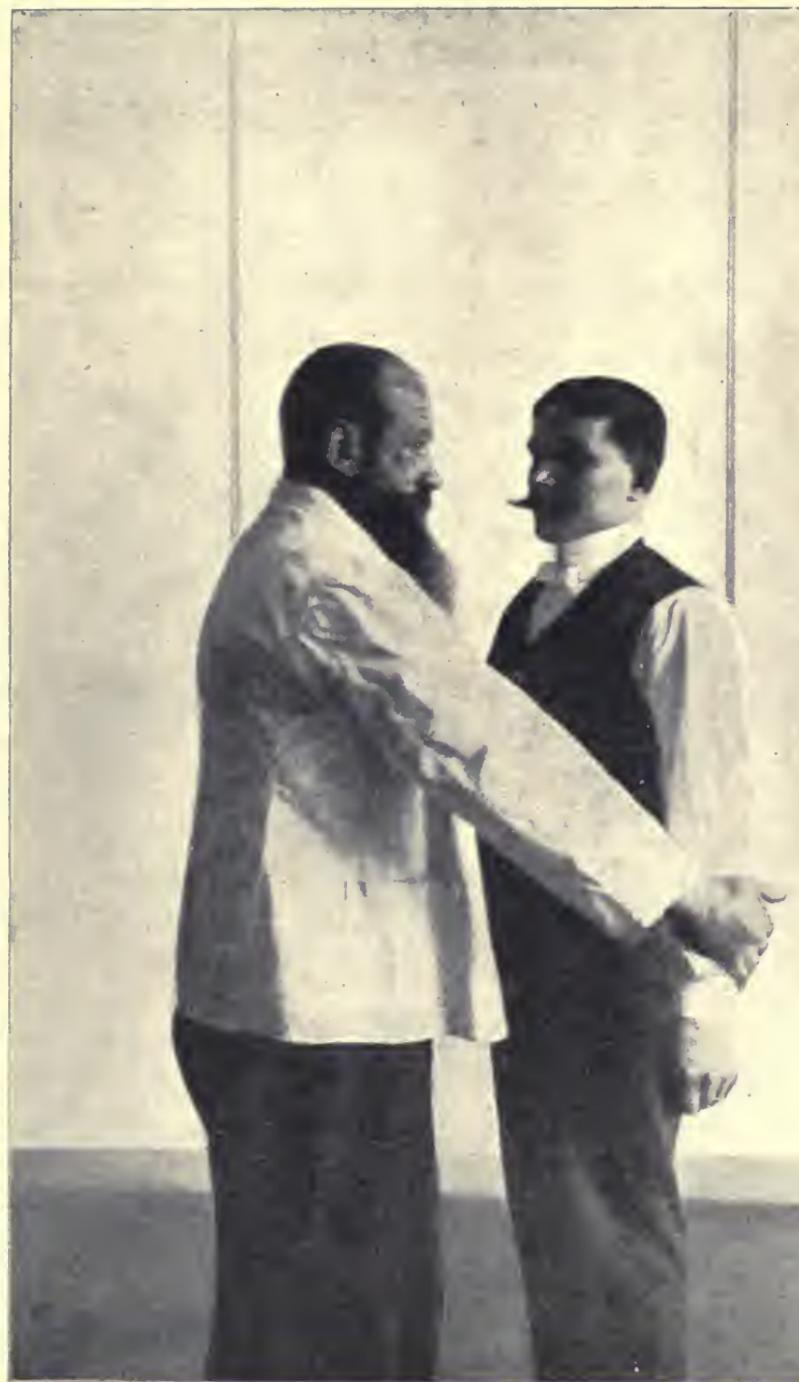


FIG. 17

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FIG. 18

### No. 13. Figs. 17 and 18.

G. stands in the military position of attention. H. places himself in front of him and takes hold of both his arms above the wrists as they hang by his sides, Fig. 17. G. now moves his arms outwards and upwards, while H. resists the action by counter-pressure downwards. The extent to which G. should raise his arms is personal, and depends upon the amount of exertion which it is advisable for him to have. When that has been reached, H. takes hold of G.'s arms in the manner shown in Fig. 18, and by counter-pressure upwards resists his action in bringing them back to the position at starting. This exercise is performed without any breathing pause between the upward and downward movements.



FIG. 19

**No. 14. Fig. 19.**

G. stands firmly in front of H. and moves his arms backwards from the vertical position. H. resists the movement by counter-pressure from behind forwards, as is shown in the illustration. The extent to which G. should move his arms backwards is personal, and depends on the amount of exertion which it is advisable for him to have. That being reached, G., without making any pause, brings his arms back to the position at starting, while H. resists the movement by pulling them backwards.



FIG. 20

**No. 15. Fig. 20.**

G. stands with one foot in advance of the other and bends both arms at the elbow till they rest against his chest. H. places himself in front of him and takes hold of both his wrists. G. then slowly thrusts his arms forwards as if he would bring his hands towards H.'s breast. H. resists the movement by counter-pressure, as seen in Fig. 20. During the return movement to the position at starting H. offers resistance by counter-traction. No breathing pause takes place during this exercise.



FIG. 21





FIG. 22

### No. 16. Figs. 21 and 22.

G. stands with his feet somewhat apart and his arms extended from his sides, in the position shown in Fig. 21, the upper arms horizontal and the forearms bent at right angles to them and elevated to the vertical, the flexor surfaces directed forwards. Retaining his arms flexed at right angles, he moves his forearms forwards and downwards by rotating the humerus at the shoulder-joint. H. stands in front of G., and taking hold of the arms near the wrists resists the movement. G. then, without pausing, proceeds to raise his forearms again to the vertical position, while H. resists the action (Fig. 22).

The arms may be exercised separately instead of simultaneously.



FIG. 23

**No. 17. Fig. 23.**

G. stands at attention and extends one arm horizontally outwards from his side, the hand being clenched. H. takes hold of G.'s clenched fist with both hands. G. rotates his arm from the shoulder-joint to the hand, first forwards and then backwards, while H. resists the movements by gentle counter-pressure, first in one direction and then in the other, as G. rotates his arm forwards and backwards.

Exercise of the other arm follows after G. has had a breathing pause.

[A considerable part of the movement in this exercise is pronation and supination of the forearm.]



FIG. 24





FIG. 25

**No. 18. Figs. 24 and 25.**

G. seats himself comfortably on a chair with his legs bent at right angles to the thighs in the usual sitting position. H., standing on one side and bending forwards towards the legs, takes hold of the one nearest to him, placing one hand over the front of the ankle, the other hand across the front of the thigh (Fig. 24). G. straightens out his leg by raising it slowly from the vertical till it is in line with the thigh. H. resists the movement by pressing the ankle downwards. H. then moves the fingers of his hand behind the ankle (Fig. 25), and by pulling in an upward direction causes resistance, while G. bends his leg and brings it back into the position at starting. After a short breathing pause the other leg is exercised in the same manner.



FIG. 26





FIG. 27

**No. 19. Figs. 26 and 27.**

G. seats himself firmly on a chair with his legs close together. H. squats in front of him and lays his hands on the outside of each knee (Fig. 26). G., keeping his feet firmly against one another, draws his knees apart, which H. resists by counter-pressure. The extent to which G. should separate his knees is personal, and depends upon the amount of exertion it is desirable for him to have. H. then places his hands on the inner sides of G.'s outstretched knees (Fig. 27) and offers resistance by pressing outwards in each direction, while G. brings his knees together again to their original position. During the exercise G. must breathe quietly. No breathing pause is permitted between the outward and inward movements of the knees.



FIG. 28

### No. 20. Fig. 28.

G. stands erect with his feet together and rests both hands on the back of a chair placed in front of him to support him during the exercise. H. places himself behind G., and stooping down, links one hand round the leg to be exercised, just above the ankle; the other hand he rests on the back of the thigh. G. slowly bends his leg at the knee, raising it backwards and upwards without moving his thigh from the vertical position, while H. resists the movement. The extent to which G. should flex his leg is personal, and depends on the amount of exertion it is desirable for him to have. G. then slowly straightens his leg and brings it back to the position at starting. H. resists the action by upward traction.

Exercise of the other leg is then proceeded with in the same manner.

[In doing this exercise there is often a tendency to move the thigh forwards. This can be readily prevented by H. placing his hand on the front of the thigh just above the knee instead of on the back of the thigh. To do this H. must place himself on the outside of the limb exercised.]



FIG. 29





FIG. 30

### No. 21. Figs. 29 and 30.

G. stands erect with his feet together and rests both hands on the back of a chair placed in front of him to support him during the exercise. H. stands behind him, and bending downwards in a stooping position, grasps the limb to be exercised just above the ankle with one hand held in the form of a fork ; the other hand he places above the buttock. Thereupon G., holding himself as erect as possible, moves the limb in the extended position backwards and upwards from the hip, while H. resists the movement (Fig. 29). The extent to which G. should move his limb backwards is personal, and depends on the amount of exertion it is desirable for him to have. That limit being reached, H. now places his hand, bent in the form of a hook, round the front of the leg immediately above the ankle, his other hand remaining as before above the buttock (Fig. 30), and offers resistance by backward traction ; while G. brings back his still extended limb to the position it was in at starting.

Exercise of the other limb is then carried out in the same manner.



FIG. 31





FIG. 32

**No. 22. Figs. 31 and 32.**

G. stands erect with his feet together and places his left hand on the back of a chair by his side to support him when standing on his left leg during exercise of the right. H. places himself to the right and in front of G., and stooping down grasps G.'s right leg just above the front of the ankle with the right hand ; his left hand he places on the front of G.'s thigh. G. now raises his limb in the extended position forwards and upwards without moving his body from the erect position, while H. resists the movement by counter-pressure (Fig. 31). The extent to which G. should advance his limb is personal, and depends on the amount of exertion he may be permitted to have. That limit being reached, H. moves his hand round the back of the leg, as shown in Fig. 32. G. then brings his still extended limb slowly back to its position at starting. H. resists the return movement by traction forwards.

After G. has taken a few deep breaths, and H. has reversed his own position and that of the chair (or G. has reversed his), exercise of the left limb is proceeded with in the same manner.



FIG. 33





FIG. 34

### No. 23. Figs. 33 and 34.

G. stands erect with his feet together and places his left hand on the back of a chair placed by his side to support him so that he may be able to stand firmly on one leg while the other is being exercised. H., standing on G.'s right side and bending down, takes hold of his right leg just above the ankle with the right hand, his left being placed on the outside of G.'s hip. G. now abducts his extended limb, raising it slowly outwards and upwards, while H. resists the movement by pressing it in the opposite direction (Fig. 33). The extent to which G. may abduct his limb is personal, and depends on the amount of exertion he is permitted to have. H. having moved his hand round to the inner side of the leg, G. begins the return movement of bringing the limb to the ground again, during which H. offers resistance to the downward progress of the limb by traction in the opposite direction. After exercise of the right limb a breathing pause follows, and then exercise of the left limb is carried out in the same manner.

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FIG. 35

**No. 24. Fig. 35.**

G. stands with his feet together in the military position of attention. H. places himself in front of G. and grasps him by both shoulders (Fig. 35). G. twists the upper part of his body slowly round, first to the right and then to the left, without altering the position his legs were in at starting. H. resists the movement by alternate counter-pressure, first on the right and then on the left shoulder. The extent to which G. should rotate his body to the right or to the left is personal, and depends on the amount of exertion which it is desirable for him to have. During this exercise there is no breathing pause between the movements.



FIG. 36

**No. 25. Fig. 36.**

G. stands erect with his feet together in the military position of attention. H. stands behind him and places his right hand on G.'s right shoulder, his left being placed on G.'s left hip. G. bends the upper part of his body to the left, as seen in Fig. 36, keeping the lower part of his body as straight as possible. Meanwhile H. resists the movement by pressing the shoulder downwards. The distance G. should bend to the side is personal, and depends upon the amount of exertion it is desirable for him to have. That being reached, G., without any pause, returns to the erect posture, while H. resists the movement by pressure with his left hand against G.'s hip. Bending to the right is then practised in exactly the same manner, the position of H.'s hands being reversed for it.

[Resistance in this exercise is, in the opinion of the Translator, best offered by H. placing his left hand on the external surface of G.'s left upper arm near the shoulder, i.e. upon the deltoid muscle of the side to which G. is going to bend, the other hand resting on G.'s opposite hip. As G. bends to the left (Fig. 36), H. resists the movement by pressing the left shoulder in the opposite direction with his left hand, while his right, pressing on G.'s right hip, assists in keeping the lower part of his body erect. For the return movement, which is made without any pause, H. reverses the position of his hands quickly, and resists the movement with both hands, but chiefly with the right. His hands are now in position to resist the movement of bending to the right, which is proceeded with after a short pause, and when the exercise is completed his hands are in the same position as they were at starting.]



FIG. 37





FIG. 38

### No. 26. Figs. 37 and 38.

G. stands with his feet together in the military position of attention. H. stands close by him and lays one hand on the middle of his chest (Fig. 37); the other hand rests on his back, between his shoulder-blades (Fig. 38). G. then bends his head and chest forwards. H. offers no resistance, but only prevents any actual forward movement taking place from the hips. The extent to which G. should bend his head and chest is personal, and depends upon the amount of exertion which it is desirable he should have. That being reached, he returns slowly and without any pause between the movements to his original position at starting.



FIG. 39





FIG. 40

**No. 27. Figs. 39 and 40.**

G. stands erect, but holds himself as laxly as possible. H. places himself opposite G.'s right side and places his right hand on the pit of G.'s stomach (epigastrium), Fig. 39; his other hand is placed on G.'s back, between the shoulder-blades, Fig. 40. G. then bends the upper part of his body backwards. To this H. offers no resistance whatever, but only steadies the patient and prevents the bending backwards being carried so far as to cause straining. The extent to which G. may bend backwards is personal, and depends on the amount of exertion he may be permitted to have. That being reached, G., without any pause and without any resistance whatsoever on the part of H., returns slowly to the erect position.







### No. 28. Figs. 41 and 42.

G. lies comfortably on a couch and pushes his feet through a leather stirrup attached to a footboard in the manner shown in Fig. 41. The footboard is thus held firmly in its position. G. takes hold of the cross-bar of the apparatus with both hands and pulls it till the springs are tightly stretched. Then by a series of forward and backward movements of his body, during which the springs are alternately relaxed and tightened, he brings himself into a sitting position. During the process of raising himself he must keep his lower limbs fully extended, and must not bend his knees even to the smallest extent. When in the sitting position he takes a few deep breaths. After that he permits his body to fall back gently to the recumbent position by dint of stretching the springs and pressure of his extended limbs against the foot-board (see Fig. 42). Again there is a breathing pause.

This exercise is not included amongst the general gymnastic exercises, but should be practised as a special one. It is particularly suitable for patients suffering from constipation and flatulency.



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